3/24/17 "The two most powerful warriors are patience and time."-Leo Tolstoy

HW: "Definite Integral" 17-20 a and b only
Test 3 on Thursday 3/30

AIM: What is the Definite Integral ?

Warm Up:

* **Recall:** The Indefinite Integral

$$\int x^2 \, dx$$

variable we are integrating with respect to.

Tells us to do an anti-derivative

Integrand (what we are integrating)

General Solution: $\frac{x^3}{3} + c$

The Definite Integral:

If $F'(x) = f(x)$, then $F(x)$ is the anti-derivative of $f(x)$.

Limits of Integration

$$\int_a^b f(x)\,dx$$

a and b will be numbers b>a and the answer will be a number.

Evaluate:

$$\int_0^2 (x^2+1)\,dx = \left.\frac{x^3}{3} + x + c\right]_0^2$$

$$= \left(\frac{(2)^3}{3} + (2) + c\right) - \left(\frac{(0)^3}{3} + 0 + c\right)$$

$$= \left(\frac{8}{3} + 2 + c\right) - \left(0 + 0 + c\right)$$

$$= \left(\frac{14}{3} + \cancel{c}\right) - \left(0 + \cancel{c}\right)$$

$$= \frac{14}{3}$$

2) Evaluate:

$$\int_1^3 (3x^2 - 4x + 2)\,dx = \frac{3x^3}{3} - \frac{4x^2}{2} + 2x + c \Big]_1^3$$

$$= x^3 - 2x^2 + 2x + c \Big]_1^3$$

$$= \left(3^3 - 2(3)^2 + 2(3) \cancel{+c}\right) - \left(1^3 - 2(1)^2 + 2(1) \cancel{+c}\right)$$

$$= (15) - (1)$$

$$= 14$$

3) <u>Evaluate:</u>

$$\int_1^4 \left(\sqrt{x}+1\right)dx = \int_1^4 \left(x^{1/2}+1\right)dx$$

$$= \frac{x^{3/2}}{3/2} + x + c \Big]_1^4$$

$$= \left(\frac{4^{3/2}}{3/2} + 4 \cancel{+c}\right) - \left(\frac{1^{3/2}}{3/2} + 1 \cancel{+c}\right)$$

$$= \left(\frac{28}{3}\right) - \left(\frac{5}{3}\right) = \frac{23}{3}$$